

CHIP PACKAGING MODULE WITH ACTIVE COOLING MECHANISMS

Abstract

The invention is directed to structure and methods of improving the cooling capacity of chip packaging modules. The chip packaging module has a substrate with thin-film wiring on one side and grooves or channels etched on one or both sides where coolant pumps are embedded. The coolant pumps are used to enhance the liquid flowing inside the module. The coolant flows through the chips within the vias in the chips or around the chips when the chips do not have vias. Both cooling modes, single or two-phase modes can be adopted in the module.